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The Florida Entomologist

Official Organ of the Florida Entomological Society

VOL. XVII MARCH 15, 1933 NO. 1

THE BIOLOGY OF PARASITES AND PREDATORS OF *LAPHYGMA EXIGUA* HUEBNER REARED DURING THE SEASON OF 1932*

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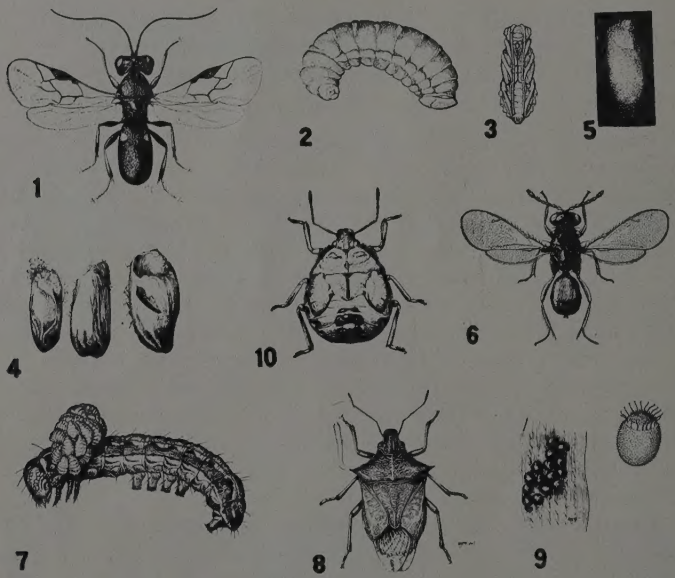
Laphygma exigua Hbn. is a common insect feeding on sugar beets and a number of other plants in the Western States. It has been reported from Mississippi feeding on corn and has probably been in the State of Florida for a number of years; but because it is easily confused with *Laphygma frugiperda* (S. & A.) it had been overlooked until the summer of 1932. At this time *L. exigua* was identified by Dr. F. H. Benjamin of the United States Department of Agriculture. It was found to be the most important Lepidopterous enemy of *Asparagus plumosus* north of Auburndale. Other Lepidoptera which attack this crop are two or three species of *Prodenia* and several species of cut worms. The Prodenia species are more abundant south of Auburndale. However, many of the parasites attacking *L. exigua* will also attack the Prodenia species.

Because of the fact that the rearing of large numbers of egg masses and larvae is a tedious undertaking and requires a great amount of care and time, sufficient egg masses and larvae have not been reared to determine the relative importance of the various parasites. The abundance and importance of the different parasites and predators was estimated by their abundance in the ferneries and by the number of each species reared from the comparatively small number of egg masses and larvae collected. Vickery (1929) has reared large numbers of egg masses and larvae of *Laphygma frugiperda*. The parasites of *L. exigua* arranged according to their abundance in the ferneries are in the same order of importance as Vickery's list of parasites for *L. frugiperda*.

During the summer of 1932 while working on the control and biology of *L. exigua* (Wilson 1932), eight parasites, four hyper-

*Contribution from the Department of Entomology of the Florida Agricultural Experiment Station.

parasites and two predators were reared from material collected in the Asparagus sheds. In addition to these parasites and predators a fungus disease was present which completely destroyed the infestation of asparagus caterpillars at certain times when the optimum weather conditions prevailed. Of the eight parasites *Chelonus texanus* Cress. was the most abundant



Explanation of Plate

Figure 1. Adult *Chelonus texanus* Cress. (Courtesy U. S. Bureau of Entomology)
Figure 2. Larva of *Chelonus texanus* Cress. (Courtesy U. S. Bureau of Entomology)
Figure 3. Pupa of *Chelonus texanus* Cress. (Courtesy U. S. Bureau of Entomology)
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and the most effective in destroying the larvae of *L. exigua.* Next in importance were *Meteorus autographae* Mues. and *Apanteles marginiventris* (Cress.) found in equal abundance. *Euplectrus platyhypenae* How. has been observed on several occasions in the ferneries at Leesburg and Pierson, but it was never abundant. At Boynton, however, it was encouraged and was very abundant. Single specimens of *Hyposoter interjectus* Gahan, *Zele melleus* (Cress.), *Gonia crassicornis* Reinh., and *Eucelatoria rubentris* Coq. were reared. The four secondary parasites reared were *Spilochalcis hirtifemora* (Ash.), *Spilochalcis albifrons* Walsh, *Catolaccus aenoviridis* (Gir.), and *Mesochorus* sp. Two predators very abundant in the ferneries were active in destroying the asparagus caterpillars. These were *Podisus maculiventris* Say and *Polistes fuscatus* var. *rubiginosus* Lep.

All of the insects listed above were identified by systematists of the United States National Museum: the Ichneumonidae by Dr. R. A. Cushman; the Brachonidae, and Chalcididae by Dr. C. F. W. Muesebeck; *Polistes fuscatus* var. *rubiginosus* Lep. by Dr. Grace Sandhouse; *Podisus maculiventris* Say by Dr. H. G. Barber; and the Diptera by Dr. J. M. Aldrich.

HYMENOPTEROUS PARASITES AND HYPERPARASITES

ICHNEUMONIDAE

Hyposoter interjectus Gahan: Vickery (1929) does not list this insect as a parasite of *L. frugiperda* in Texas nor does Luginbill (1928) give it as a parasite of *L. frugiperda* in the southeast. Only one specimen was reared at Leesburg, thus it may be only an occasional parasite of the *Laphygma.* The pupa was collected in a cage in the insectary containing a large number of asparagus caterpillars on June 5, 1932. The adult emerged June 10, 1932.

The pupal case is 6 mm. long and 2.5 mm. in diameter, covered with a mass of silken threads which are greyish white in color and bind the pupal case to the asparagus spray. In spots the black pupal case shows through where the threads are not thickly placed.

The adult is 4.5 mm. long with a black head and thorax; the first segment of the antennae is straw colored, the remainder of the segments being black; the abdomen is a reddish brown color, and the legs are a light straw color with a black spot on the distal end of the rear tibiae, and black rear tarsi.

Mesochorus sp.: Three pupal cases of this hyperparasite of *L. exigua* were collected in the fernery on August 15, 1932 and the adults emerged August 22, 1932. This secondary parasite is given by Luginbill as a parasite of *Meteorus laphygmae.* Luginbill also states that three individuals were reared from 295 *Meteorus laphygmae* cocoons indicating that this is an insignificant secondary parasite.

The cocoon is 4.5 mm. long and 1.5 mm. in diameter, white in color and covered with silk threads.

The adult is 3 mm. long. The entire body is a light brown color with the first segment of the abdomen somewhat darker.

BRACHONIDAE

Chelonus texanus Cress.: Numerous attempts were made to rear this parasite in captivity. Vickery (1929) has found that it is necessary to have the host larva go into the ground prematurely and construct a cell known as the death cell. Under the conditions prevailing in the insectary I was not able to get the host larva to construct the necessary death cell. Numbers of *Chelonus* larvae emerged from the host but because of the absence of the cell they soon died. As has already been indicated this insect was very abundant in the fernery and frequently emerged from host larvae collected in the fernery. Vickery states that 33 per cent of all the fall army worms collected at Brownsville, Texas were parasitized by this insect. Since large numbers of the host were collected this probably represents the true status of this parasite in the vicinity of Brownsville.

Chelonus texanus has been collected in many sections of Texas, at Shreveport, La., Morrilton, Ark., Greenwood, Miss., and is reported as being abundant at Columbia, S. C. by Luginbill (1928).

The adult female (Fig. 1) oviposits directly in the eggs of *L. exigua. Females* were placed in test tubes containing egg masses of *L. exigua* and usually began ovipositing immediately. The female parasite approaches the egg mass and places the antennae on an egg, she then places the ovipositor over an egg and thrusts it into the egg retaining it there for a few seconds. The female will work back and forth over the egg mass selecting eggs at random, the antennae vibrating vigorously all of the time.

The host egg develops normally, hatching in the same length

of time as unparasitized eggs. The host larva also develops normally to the third or fourth instar. Parasite larvae reared in the insectary at Leesburg emerged from the host during the third instar. The host larvae attempted to pupate eleven to fourteen days after the parasite egg was laid. The Chelonus larva emerged on the twelfth to fifteenth day after oviposition by the female. Vickery gives the length of time elapsing from oviposition to the time of cocoon formation as eleven days in August and twenty-two days in October. At Columbia the time elapsing between the hatching of the Laphygma larva to pupation of the Chelonus larva was twelve to fourteen days.

The larva of Chelonus (Fig. 2) was whitish in color. Lu[illegible]inbill states that the parasite passes the winter as a pupa (Fig. 3) in the cocoon (Fig. 4 & 5).

Adult Chelonus feed at the nectaries of cotton and a number of other plants. Data on the number of generations produced during a season was not obtained.

Apanteles marginiventris Cress. is another parasite abundant in the ferneries at Leesburg. This parasite appears to have a wide distribution in the Southern States. It has been reported from various localities in Texas, Louisiana, Mississippi, Oklahoma, Kansas, Florida, Georgia, South Carolina and Tennessee.

The female Apanteles lay their eggs in the first instar larvae of the host usually before they disperse. Oviposition is accomplished very quickly, the female thrusting her ovipositor into the larva and withdrawing it immediately.

According to Vickery the length of time from oviposition to the emergence of the full grown parasite larva varies considerably even in groups of parasite eggs deposited at the same time. In June the time ranged from seven to eleven days, in October from seven to thirteen days, and in November from ten to fourteen days. A single parasite larva emerges from each *Laphygma* larva during the fourth instar.

The cocoons are 3 mm. in length and 1.5 mm. in diameter, smooth, white in color, and covered with a network of colorless silk threads by which they are attached to supports. In the fernery they are found attached to the upper surface of the asparagus sprays.

Adults emerged from cocoons collected in the fernery after 2 to 6 days, the average being 3.3 days. The shortest pupal period for this parasite in Texas was 5 days.

Meteorus Autographae Mues.: This parasite was found in the

ferneries in about the same numbers as Apanteles marginiventris. This parasite has been reared from *Laphygma frugiperda* larvae at Nashville, Tenn. and Columbia, S. C.

Observations on the oviposition and length of the larval stage have not been made. Numbers of adults, however, were reared from parasitized larvae brought into the insectary. The adult parasite emerged from cocoons formed in the insectary after six days. An adult issued from a cocoon two days after it was collected.

The adult female usually lays its eggs in second or third instar host larvae. This parasite may reproduce parthenogenetically but the progeny are always males when the female is not fertilized.

The cocoon is 5.5 mm. long and 2 mm. in diameter, a light brown in color with a dark spot at the posterior end and transparent. It is attached by a single long thread to the asparagus spray. The parasites were present in the fernery from June to September inclusively.

Zele melleus (Cress.): A single specimen of this parasite was reared from parasitized *L. exigua* larvae by Mr. C. C. Goff at Leesburg in 1931. This parasite emerged June 25, 1931. Various entomologists of the Bureau of Entomology have reared this parasite in small numbers from *L. frugiperda* at Chillicothe, and Brownsville, Texas, Nashville, Tenn., Columbia, S. C., and Shreveport, La. Vickery reared only three adult *Zele melleus* from 16,000 *L. frugiperda* larvae at Brownsville, Texas.

CHALCIDIDAE

Two secondary parasites belonging to this family were reared, both from *Apanteles marginiventris* (Cress.)

Spilochalcis hirtifemora (Ashm.): Two individuals of this hyperparasite were reared from cocoons of *Apanteles marginiventris* collected in the fernery. The adults of *S. hirtifemora* emerged ten days after the cocoons were collected.

No information was obtained concerning the habits and development of this species.

Spilochalcis albifrons Walsh: A single adult of this species was reared from cocoons of *Apanteles marginiventris* collected in the fernery. The adult *S. albifrons* emerged seven days after the cocoons were collected. The adults of this and the preceding species were collected during August.

PTEROMALIDAE

Catolaccus aenoviridis (Gir.): Several adults of this small black hyperparasite were reared from cocoons of *Apanteles marginiventris* collected in the fernery during July and August. One adult *C. aenoviridis* emerged two days, one three days, one six days and several ten days after the cocoons of *A. marginiventris* were collected in the fernery.

All of the secondary parasites were collected in such small numbers that they appeared not to reduce the primary parasites to any appreciable extent.

EULOPHIDAE

Euplectrus platyhypenae How.: Although this parasite was not collected in large numbers at Leesburg it is easily reared, and being a gregarious external parasite all phases of the life cycle can be observed with little difficulty. Perhaps the systematic application of arsenate of lead reduces the numbers of this parasite as the female prefers to oviposit on the third or fourth instar host larva.

Euplectrus platyhypenae was described by Howard (1885) from larvae of *Platyhypenae (Platyhypena) scabra* Fabr. from the District of Columbia. Schwartz (1881) gives an account of the life history of *E. comstockii* How. Riley (1885) and Vickery (1926) state that this parasite was introduced into Hawaii in 1923 as a parasite of the army worms. It was reared in the laboratory for three years, but due to the intermittent appearance of the army worms it was not able to survive in the field. Smith (1927) gives a comprehensive account of the parasite but he was unable to induce the captive females to lay eggs and for this reason his account is incomplete in some respects. Luginbill (1928) and Vickery (1929) also give accounts of this parasite reared on *L. frugiperda* larvae at Columbia, S. C. and Brownsville, Texas.

Euplectrus platyhypenae has been reported as parasitizing a number of noctuid species. The following is a list of hosts which have been reported:

Host	*By whom reported and date*	
Platyhypenae (Platyhypena) scabra Fabr.	Howard	1885
Laphygma frugiperda S. & A.	Vickery	1915
Heliophilia unipuncta Haw.	Vickery	1915
Heliophilia subpunctata Haw.	Vickery	1915
Cirphis latiuscula H. S.	Vickery	1926
Lycophotia margaritosa Haw.	Smith	1927

Caenurgia erechtea Cram.	Smith	1927
Plusia simplex Guen.	Smith	1927
Heliothis obsoleta Fabr.	Smith	1927
Laphygma exigua Hbn.	Vickery	1929
Cirphis latiuscula H. S.	Vickery	1929
Cirphis unipunctata Haw.	Vickery	1929
Prodenia sp.	Vickery	1929

At Leesburg it was reared from *Laphygma exigua* Hbn. and was observed breeding on *Prodenia sunia* Gn. at Boynton, Fla.

At one time during the life history studies, first and second stage host larvae were all that were available for the parasite females to oviposit on. For ten days these small larvae were offered to the parasites but no eggs were deposited until third and fourth stage host larvae were made available. The eggs are laid in groups ranging from three to thirty in number usually on the thoracic or first three abdominal segments. Of 4012 eggs deposited they were placed as follows:

First Thoracic Segment	3
Second Thoracic Segment	83
Third Thoracic Segment	531
First Abdominal Segment	1254
Second Abdominal Segment	1027
Third Abdominal Segment	495
Fourth Abdominal Segment	384
Fifth Abdominal Segment	105
Sixth Abdominal Segment	105
Seventh Abdominal Segment	47
Eighth Abdominal Segment	14
Ninth Abdominal Segment	0
Total	4012

Eggs placed on the posterior abdominal segments are frequently knocked off by the host larva after the eggs hatch.

During the months June to September inclusive with an average temperature of 81.4° F. the average length of the egg stage was 2.28 days. During this time 9 generations were reared. From the middle of November to the latter part of December while the average temperature was 63.2° F. the egg stage lasted 8 days. A summary of the data is given for each generation in Table 1.

At the time of hatching, the egg splits longitudinally down the dorsal surface and the larva immerses its head in the skin of the host larva without moving out of the egg shell. In a few hours the egg shell has disappeared beneath the larva. Cush-

TABLE No. 1.—A Summary of the Data Accumulated for Immature Stages of *Euplectrus platyhypenae*. Time is Given in Days.

Generation No.	No. eggs used	No. eggs hatching	% eggs hatching	Av. length egg stage	Av. length larval stage	Av. length prepupal stage	Av. length pupal stage	No. adult females emerging	No. adult males emerging	Ratio males and females	Dates first hatching to last adults
2	290	243	83.79	2.40	3.60	1.36	4.21	92	30	1-3.06	6/12/32 6/29/32
3	159	110	69.18	2.66	3.50	1.50	4.25	47	30	1-1.50	6/28/32 7/11/32
4	220	151	68.63	2.04	3.12	1.25	4.06	53	22	1-2.40	7/10/32 7/26/32
5	167	147	88.02	2.10	3.00	1.00	4.45	73	12	1-6.08	7/23/32 8/ 7/32
6	152	114	75.00	2.33	3.25	1.25	4.50	37	4	1-9.22	8/ 6/32 8/29/32
7	113	103	91.14	1.87	4.00	2.00	4.00	15	5	1-3.00	8/17/32 8/28/32
8	94	76	80.85	2.50	3.50	2.00	4.00	21	7	1-3.00	8/26/32 9/15/32
9	84	77	91.67	2.33	4.25	2.00	5.66	24	3	1-8.00	9/17/32 9/28/32
Averages or totals for first eight Generations	1279*	1021*	79.82	2.28	3.53	1.54	4.39	362*	113*	1-3.20	Averages
10	109	76	70.55	3.11	5.00	2.00	6.62	20	18	1-1.11	10/ 3/32 10/24/32
11	130	94	72.30	3.06	4.80	2.60	5.16	28	15	1-1.70	10/22/32 11/ 4/32
12	115	75	65.21	8.00	9.75	4.75	15.25	30	7	1-4.28	11/11/32 12/27/32

Average temperature June to September inclusive 81.4° F. October 71.2° F. November 62.8° F. December 67.1° F.
*Totals.

man (1926) has shown that the egg shell holds the first instar in place. The exuvium of the first instar is laid down over the egg shell and the second exuvium lies above the first exuvium, and thus the dark brown somewhat gelatinous mass beneath the parasite larva holds it in place on the back of the host larva. The number of molts was not determined, but Smith (1927) believes that there may be only two. The average length of the larval stage for the first nine generations was 3.53 days. The twelfth generation larvae required 9.75 days for development (see Table No. 1).

Parasitized *L. exigua* larvae did not molt after the parasite eggs were laid. Frequently females of *E. platyhypenae* refused to lay eggs on larvae almost ready to molt, but waited until the ecdysis was completed. The host larva feed normally throughout the period of the parasite larval development. In some cases the host larva was still very active at the time the Euplectrus larvae began to try to tie it down with threads and managed to leave some of the pupating Euplectrus larvae on the bottom of the rearing cage. Usually the host larva is in a weakened condition when the parasitic larvae begin to move around to the ventral surface. The Euplectrus larvae then spin a coarse thread attaching the host larva to the bottom of the breeding cage or to the asparagus spray. These threads also help to hold the naked pupa in place. At first the pupa is a light brown color turning almost entirely black in a short time. The average length of the pupal stage for the first nine generations was 4.39 days. During December with an average temperature of 63.2° F. the pupal stage required 15.25 days.

The adult parasite has a black thorax, and the dorsal surface of the abdomen is black. The antennae, legs and ventral surface of the female abdomen is light brown in color. The ventral surface of the male abdomen is margined with black. The adults are very long lived. Females not allowed to mate or oviposit lived from September 28 to December 7. The average length of life of the normally functioning females was 11.53 days while the average length of life for the males was 9.65 days (see Table No. 2).

A male and female parasite were placed in the ordinary 18 x 155 mm. test tube and fed honey and water. Third and fourth stage host larvae were introduced into these test tubes with a spray of asparagus for food. Oviposition seemed to take place normally in these test tubes which were stoppered with cotton.

TABLE No. 2.—A Summary of the Data Accumulated for Adult Females of *Euplectrus platyhypenae*. Time is Given in Days.

Generation No.	No. of females	Date of emergence	Av. length of preoviposition periods	Total No. eggs laid	Ave. No. eggs per female	Av. No. eggs per female per day	Length oviposition period	Length female life	Length male life	Largest No. eggs laid by single female	Smallest No. eggs laid by single female
1	3	6/ 8/32	2.0	307	102.36	9.03	11.33	12.00		116	90
2	7	6/24/32	0	407	58.14	14.07	4.13	17.00	8.00	90	20
3	10	7/ 7/32	1.7	454	45.40	9.27	4.90	6.80	15.30	125	19
4	10	7/19/32	Eggs laid within 24 hrs.	669	66.90	10.62	6.30	8.40	6.00	119	12
5	10	7/31/32		961	96.10	11.16	8.60	11.00	10.25	145	46
6	5	8/14/32		421	85.20	11.36	7.50	9.60	6.50	105	74
7	10	8/27/32		761	76.10	12.47	6.10	8.00	9.00	134	20
8	5	9/11/32	3.0	604	120.80	12.08	10.00	15.33		136	97
9	3	9/28/32	2.0	392	130.66	9.84	13.33	15.66	12.50	142	117
Averages and totals for first nine generations	63*			4976*	86.85	11.10	8.02	11.53	9.65		Average
10	3	10/ 6/32	4.0		67.66	8.45	8.00	11.00	12.00	77	61
11	3	11/ 5/32	2.0		61.66	4.20	14.66	17.00	24.00	90	10

*Totals.

The parasitized host larvae were transferred to ½ pint paper cartons and kept there until the adult parasites emerged.

In Florida the parasites continue development during the winter although the life processes are slowed up during cool periods. The long life of the adult also helps to carry the species through periods when food for the larvae is scarce.

This species may reproduce parthenogenetically but the progeny of unfertilized females is always males. In all of the generations the proportion of males to females produced was always in favor of the females. The ratio of males to females varied from 1:1.5 for the third generation to 1:9.22 for the sixth generation, the average for the first nine generations being 1 male to 3.2 females (see Table No. 1).

VESPIDAE

Polistes fuscatus var. *rubiginosus* Lep: Large numbers of these wasps were present in the ferneries during the entire summer. Mr. Goff observed the wasp capturing the larva and preparing it for transportation back to the nest. I was never fortunate enough to observe this phenomenon although I spent a great deal of time in the fernery. Mr. Goff's description of the process follows: "After following a wasp about for sometime I saw her make a dart for a large larva but for some reason missed her prey. Several times larvae escaped by falling to the ground as the wasp approached. Finally the wasp was successful in capturing a larva in probably the fifth instar. As far as I was able to observe the wasp did not sting the larva but immediately began to chew at it vigorously, holding the larva with her front feet. In approximately five minutes the wasp had peeled the skin from the larva and flew away with the viscera."

HEMIPTERA

PENTATONIEDAE

Podisus maculiventris Say: This predator was very abundant in the ferneries at Leesburg from the latter part of June to the latter part of August. The adults (fig. 8) have a long life and are voracious feeders, one adult captured on June 26 lived to September 4, during which time 122 *L. exigua* larvae of the fourth and fifth instars were consumed. The stink bug approaches the larva cautiously with the beak outstretched, and immediately presses the beak into the larval skin. By the time the larva begins wiggling in an attempt to escape, the stink bug

has secured sufficient hold to make any amount of wiggling unsuccessful. No larvae were observed to escape. At one time larvae of *Mocis repanda* Fabr. were introduced into the cage. The larvae of this species were much more active when attacked by the stink bug but I did not observe one get away after the stink bug had pierced it.

The eggs are placed in masses on the asparagus spray or other convenient supports (fig. 9. A. & B.). A female captured in the fernery on August 5 had laid a total of 871 eggs by September 23. Two reared females laid 238 and 768 eggs respectively. The average length of the egg stage during September was 5.08 days with an average temperature during the same time of 78.8° F.

The newly hatched nymphs have a black head and thorax and red abdomen with black marginal spots on each segment and four transverse black spots at the center of the dorsal surface. The nymphs from an egg mass are gregarious for the first two or three days, moving about in a body in close formation. While very young the nymphs feed on the tender plant shoots but they do not appear to injure the asparagus plant for after their first few meals they begin feeding on the smaller larvae. The nymphs (fig. 10) molt five times and require 20-23 days during the latter part of August and the first part of September to complete their development. The average temperature for August 1932 was 84° F.

Three generations of this predator were reared from August to December 20 when the supply of *L. exigua* larvae gave out. This species probably passes the winter in the adult stage. In addition to *L. exigua* it feeds upon a number of other noctuidae and caterpillars as well as *Diabrotica duodecimpunctata* oliv. and *Leptinotarsa decemlineata* Say. It has a wide distribution in the South and according to Hart (1919) is the most useful of our predacious Hemiptera.

DIPTERA

TACHINIDAE

Gonia crassicornis Reink.: A single specimen of this dipterous parasite was taken from a rearing cage on July 1, 1932. Van Dine (1913) also reared this parasite from a fall army worm in Porto Rico in 1912. It appears to be a rare parasite of the Asparagus caterpillar.

Eucelatoria rubentris Coq.: A single adult was reared by Mr.

C. C. Goff in 1931. The larval parasite emerged from the host larva on August 27, 1931 and the adult fly emerged on September 4, 1931. This also appears to be a rare parasite as it is mentioned neither by Luginbill (1928) nor Vickery (1929).

FUNGI

The fungus *Spicaria prasina* (determined by Mr. Erdman West of the Fla. Agr. Exp. Sta.) during wet weather destroys enormous numbers of *L. exigua* larvae and attacks the larvae in all stages. I have seen entire infestations of the caterpillar destroyed by this fungus when the optimum weather conditions prevail for its development. The larva becomes stiff and is covered with a white mass of the spores soon after death.

Vickery (1929) has pointed out that there is considerable competition among the parasites of a given host. If the less efficient species survives, its attack serves to reduce the numbers of the more efficient species. He illustrates this point with *Chelonus texanus* which has comparatively long egg and larval stages. It is thus possible that a rapidly growing parasite may attack the host larvae and destroy the Chelonus larvae. Again *Euplectrus platyhypenae* attacks the larval stages of the host. If the host happens already to be parasitized by a rapidly growing parasite, the host larva may die even before the Euplectrus eggs have had time to hatch. Frequently in the insectary host larvae which bore Euplectrus eggs were destroyed by the fungus *Spicaria prasina* before the Euplectrus eggs hatched. Also we have the secondary parasites which attack the primary parasite. However, the secondary parasites reared during 1932 were comparatively few in numbers and did not appear to be reducing the primary parasite population to any appreciable extent.

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AN OUTBREAK OF *MOCIS REPANDA* FABR.

By J. R. WATSON

This Noctuid moth, formerly called *Regimia rapanda,* is a common insect in the grass lands of Florida. In collecting pupae of the *Anticarsia gemmatilis* in velvet bean patches, we always take a small number of these larger pupae, but not until this year have we ever observed "armies" of these caterpillars. But in September and October of last year the insect was so numerous as to completely strip many species of grasses in the central part of the state, including bermuda grass, crab grass, and natal grass. In many good-sized groves these grasses were entirely stripped of leaves. Such groves were noted mostly in Polk County and in Lake County. Numerous reports came in from other parts of the state.

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Official Organ of The Florida Entomological Society, Gainesville, Florida.

VOL. XVII MARCH 15, 1933 No. 1

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Issued once every three months. Free to all members of the Society.

Subscription price to non-members is $1.00 per year in advance; 35 cents per copy.

TWO NEW SPECIES OF PLECTROTHRIPS*

J. R. WATSON

Plectrothrips montanus n. sp.

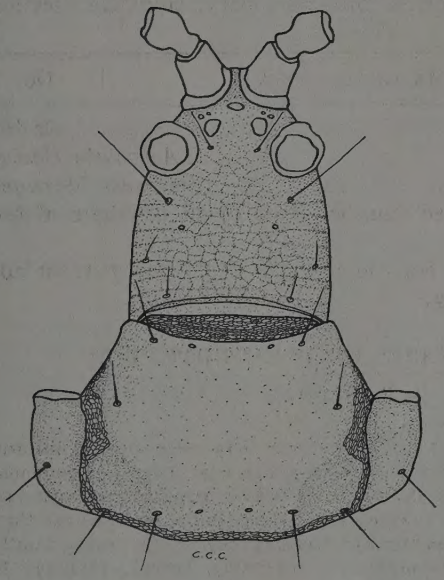
Winged female. Length 1.7 mm. General body color, nearly uniform dark brown. Abdomen darker, especially posteriorly. Legs and antennal segments 1 and 2 and pedicle of 3 brownish yellow; remainder of antennae dark brown. Tube darker in middle. Head about one seventh longer than wide. Vertex rounded, extending considerably beyond the eyes, faintly reticulated. Cheeks slightly converging posteriorly, sharply rounding to eyes. Postocular bristles very long (105 microns) sharp pointed. Very pale yellow, as are all body bristles. Their bases much nearer to the eyes than to the posterior border of the head. Posterior to these but still nearer the eyes than the posterior border of the head is a pair of small bristles. Post-ocellar bristles also long and conspicuous, two thirds as long as the post-ocular. A much shorter but still conspicuous bristle in front of each posterior ocellus.

Eyes small, occupying about a fifth of the length of head, sharply protruding and showing four or five large facets in margin. Ocelli large, yellow. Anterior borders of posterior ones opposite anterior border of eyes. Anterior directed forward.

Mouth cone reaching to the middle of the prosternum, broadly rounded at the tip. Prothorax longer than the head and (including coxae) 1.5 times as wide as long. A pair of long pointed bristles at each posterior angle and one nearly as long on each coxa. A long slender one on each anterior angle and a similar one near the middle of each lateral margin.

Pterothorax slightly wider than prothorax. Sides nearly straight but sharply converging posteriorly. Wings short, reaching only to the 5th abdominal segment. Membrane gray, especially in apical half. No interlocated bristles on margin. Legs almost uniform brownish yellow, only outer margins of femora slightly clouded with brown. Fore tibia with a short, obtuse tooth on inner margin of apex. Fore tarsal tooth very long, stout, and slightly curved.

*Contribution from Department of Entomology, Florida Agricultural Experiment Station.



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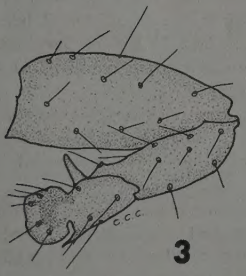

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Explanation of Plate

Fig. 1. *Plectrothrips montanus* n. sp. Head and prothorax of female.
Fig. 2. *Plectrothrips montanus* n. sp. Right antenna, dorsal side.
Fig. 3. *Plectrothrips montanus* n. sp. Left fore leg, ventral.
Fig. 4. *Plectrothrips bruneri* n. sp. Right fore leg, dorsal side.

Abdomen large. Sides sub-parallel to segment 8, thence rounded abruptly to base of tube. Bristles on segment 9 slightly longer than the tube. Tube nearly a third shorter than head. Sides nearly straight. Terminal bristles hardly as long as tube.

Apterous female. Very similar in size and color to winged female, but head and thorax sometimes almost as yellow as legs, and antennal segments 3-6 sometimes brownish yellow. Ocelli lacking.

Male. Very similar to apterous female. Fore femora slightly enlarged.

Nymph. Pale grayish yellow with much bright yellow hypodermal pigment.

Measurements: (a) Type, winged female, (b) average of 7 apterous females, (c) type male.

	Body length	Head		Prothorax		Ptero-thorax	Abdom'n	Tube		
		length	breadth	length	breadth	breadth	breadth	length	breadth	
									base	Apex
a.	1.7	.186	.163	.20	.32	.33	.35	.13	.093	.04 mm.
b.	1.6	.190	.164	.20	.31	.30	.36	.13	.084	.039 mm.
c.	1.4	.186	.163	.21	.30	.28	.30	.128	.079	.035 mm.

Antennae in microns, length (width).

Seg.	I	II	III	IV	V	VI	VII	VIII	Total
a.	47 (42)	47 (37)	65 (35)	61 (32)	61 (32)	56 (35)	47 (30)	35 (16)	.38 mm.
b.	47 (42)	47 (34)	65 (33)	58 (33)	57 (32)	55 (30)	44 (27)	36 (15)	.38 mm.
c.	47 (44)	47 (30)	65 (32)	54 (32)	54 (30)	51 (28)	42 (26)	35 (15)	.38 mm.

Described from a single winged female, 11 apterous females, and 15 males, collected by placing in a Berlese funnel dead leaves under deciduous trees collected at Gatlinburg, Tenn. Aug. 1932. Differs from *P. antennatus* in larger mouth cone, spines on prothorax, small protruding eyes, color of antennae, and absence of interlocated hairs on fore wing.

PLECTROTHRIPS BRUNERI n. sp.

Macropterous female. Length 2.7 mm. Body color varying from yellowish brown to light brownish yellow or gray with small, scattered blotches of scarlet hypodermal pigment. Tube a bright sulphur yellow, deeper in basal half where it is shaded with brown in the darker individuals. Fore tibiae and tarsi yellowish.

Head only a little longer than wide. Widest close behind the eyes, sharply narrowed posteriorly to .8 its greatest width. Dorsal surface covered with very fine, faint hexagonal reticulations which become irregular striations on the sides. Post-ocular bristles situated about a quarter of the distance from the eyes to posterior margin, pale, pointed, and long, extending beyond the eyes. A diagonal row of three small bristles posterior to each post-ocular, and a somewhat larger towards the median line. A small bristle in front and another behind each posterior ocellus. *Eyes*, large, occupying about a third of the length of the head; finely faceted. *Ocelli* large, posterior pair situated opposite the anterior third of eyes, which they do not quite touch. Anterior directed forward. *Mouth cone* two-thirds as long as the remainder of head, reaching half across prosternum.

(To be continued)

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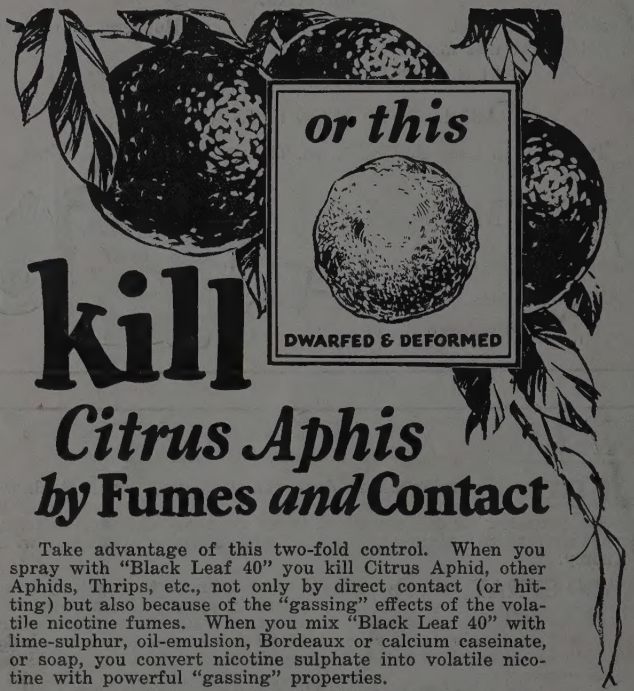

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